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<b>UTILITY</b> <b>PATENT APPLICATION</b> <b>TRANSMITTAL</b> <small>(Only for new nonprovisional applications under 37 CFR 1.53(b))</small>		<b>Attorney Docket No.</b> <b>BS100/177618</b> <b>Total Pages</b>																																																																				
		<b>First Named Inventor or Application Identifier</b> <b>William M. Seal</b>																																																																				
		<b>Express Mail Label No.</b> <b>EM216270037US</b>																																																																				
<b>APPLICATION ELEMENTS</b> <small>See MPEP chapter 600 concerning utility patent application contents.</small>		<b>ADDRESS TO:</b> <small>Assistant Commissioner for Patents Box Patent Application Washington, D.C. 20231</small>																																																																				
<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"> <b>1. <input checked="" type="checkbox"/> Fee Transmittal Form</b>  <small>(Submit an original, and a duplicate for fee processing)</small> </td> <td style="width: 50%;"> <b>6. <input type="checkbox"/> Microfiche Computer Program (Appendix)</b> </td> </tr> <tr> <td colspan="2"> <b>2. <input checked="" type="checkbox"/> Specification</b> <b>Total Pages</b> <b>1254</b> </td> </tr> <tr> <td colspan="2"> <small>(preferred arrangement as set forth below)</small> <ul style="list-style-type: none"> <li>- Descriptive title of the Invention</li> <li>- Cross References to Related Applications</li> <li>- Statement Regarding Fed sponsored R &amp; D</li> <li>- Reference to Microfiche Appendix</li> <li>- Background of the Invention</li> <li>- Brief Summary of the Invention</li> <li>- Brief Description of the Drawings (if filed)</li> <li>- Detailed Description</li> <li>- Claim(s)</li> <li>-Abstract of the Disclosure</li> </ul> </td> </tr> <tr> <td colspan="2"> <b>3. <input checked="" type="checkbox"/> Drawing(s) (35 USC 113)</b> <b>[Total Sheets]</b> <b>14</b> </td> </tr> <tr> <td colspan="2"> <b>4. <input checked="" type="checkbox"/> Oath or Declaration</b> <b>[Total Pages]</b> <b>4</b> </td> </tr> <tr> <td colspan="2"> <ul style="list-style-type: none"> <li>a. <input type="checkbox"/> Newly executed (original or copy)</li> <li>b. <input type="checkbox"/> Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional with box 17 completed) [Note Box 5 below]</li> </ul> </td> </tr> <tr> <td colspan="2"> <i>i. <input type="checkbox"/> DELETION OF INVENTOR(S)</i>  <small>Signed statement attached deleting inventor(s) named in the prior application. 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<b>FEE TRANSMITTAL</b>		<b>Complete if Known</b>		
		Application Number		
		Filing Date	09/11/98	
		First Named Inventor	William M. Seal	
		Group Art Unit		
		Examiner Name		
<b>TOTAL AMOUNT OF PAYMENT</b> <input type="text" value="(\$872.00)"/>		Attorney Docket Number	BS100/177618	

<b>METHOD OF PAYMENT</b> (check one)		<b>FEES CALCULATION (continued)</b>																																																																																																																																																																																																																																					
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Name	Geoff L. Sutcliffe Kilpatrick Stockton LLP			Reg. No. 36,348
Signature	<i>Geoff L. Sutcliffe</i>		Date 09/11/98	Deposit Account User ID 11/0855

## OUTSIDE PLANT CONSTRUCTION MANAGEMENT SYSTEMS AND METHODS

This application claims priority to patent application Serial Nos. 60/058,504; 60/058,570; 60/058,571; 60/058,572; 60/058,579; 60/058,580; 60/058,581; 60/058,582; 5 60/058,641; 60/058,657; and 60/058,658, all concurrently filed on September 11, 1997, the disclosures of which are incorporated herein by this reference.

### FIELD OF THE INVENTION

The present invention relates generally to systems and methods for managing jobs and tasks and, more particularly, to systems and methods for managing outside plant construction contracts throughout the life-time of the contracts and for managing labor and materials from within a company.

### BACKGROUND OF THE INVENTION

15 Many of the Regional Bell Operating Companies (RBOCs) inherited a system called Job Management Operation System (JMOS). As the name suggests, JMOS is used to manage jobs and is useful in tracking the status, staffing, and billing on various contracts performed on behalf of the RBOC. JMOS provides functionality in many aspects of job management, including employee time input, scheduling, and billing.

20 With regard to employee time input, JMOS requires employees to write down their time each day and provide their records to clerks. The clerks inputs the employees time into JMOS. If the data is accepted by JMOS then it is forwarded to the payroll system (MTR)

Mechanized Time Reporting system. The MTR system provides printouts back to the employees to verify the accuracy of the time reports. The employees provide the clerks with the necessary corrections which the clerks input again into JMOS. Thus, at the earliest, the time for an employee would not be provided to the MTR system until the next night. JMOS 5 does not handle any exceptions to a regular scheduled day i.e. overtime or vacation time.

This information had to be entered directly into the MTR system by the clerks.

The completion of tasks is accomplished in a similar manner. A technician, for instance, upon completion of a task would take the task off of a blue print and translate the task into a written report. The technician sends the report to a clerk who, the following day, 10 interprets them and tries to enter them into JMOS. If the report is unintelligible, such as because the report is poorly written or was sent via facsimile, the clerk may incorrectly enter the task. If JMOS does not have a match for that task, then the clerk notifies the technician who then has to provide the correct information for entry into JMOS. The recording of a completed task would therefore take at least one full day, and possibly more, before JMOS is 15 able to recognize the event.

The paying of contractor invoices is challenging with JMOS. When a task or tasks are completed, the contractor generates a written invoice and sends that invoice to the appropriate supervisor for approval. If the supervisor disagrees with the extent of work performed or the amount to be paid, the supervisor would note these concerns on the invoice 20 which would be returned to the contractor. After the contractor and supervisor come to an agreement, the acceptable invoice is sent to the billing department. With the invoice, a clerk

has to enter the invoice into JMOS and also some information into a voucher system in order to pay the contractor.

JMOS therefore suffers from a disadvantage in that it does not provide real-time data.

As discussed above, the employees' time and the recognition of completed jobs are dated at

5 least one day by the time they are entered into JMOS. The interface with the contractors presents even more delays in the processing of invoices and recognition of completed work. The current system requires the circulation of invoices to various departments within a company.

## 10 SUMMARY OF THE INVENTION

The present invention addresses the problems described above by providing systems and methods for managing jobs. A preferred embodiment of a system and method according to the invention is commonly referred to as Outside Plant Construction Management (OSPCM) system and method. The OSPCM system eliminates the need for much of the 15 paperwork and clerical work required in conventional systems, thereby reducing workload and overhead. The OSPCM system covers virtually the entire contract life-time, including the bidding and awarding of the contract, the pricing, the entry of the job, the scheduling, the management of materials, the billing and reporting, and inspections.

The OSPCM system includes a regional contracts application for maintaining uniform 20 information on contracts. The regional contracts application, for example, may code all work tasks of burying a cable as 101A and would include a unit price, such as \$1.00 a foot. A bid and award application formulates a bid that is sent to each of the bidding contractors. The

bid and award application fabricates this bid using historical data gathered from prior jobs and therefore can easily ascertain the needs of a particular contract. The bidders receive the bid package, either electronically or in printed form, and input their price information and other data and return their completed bids. The completed returns are input into the OSPCM system. The bid and award application is also used to view and evaluate the bids, to award the bid to one of the contractors, and to notify the bidders appropriately.

A job entry application in the OSPCM provides job details of a particular contract. The job entry application, for example, breaks down a contract into the individual tasks and sub-tasks and also performs a configuration process. The configuration process assigns standard time increments to all tasks. It assigns contract work items based on the contract in effect for the job. The configuration process also groups tasks into scheduling activities, sequences the tasks so that tasks dependent or otherwise tied to each are performed in the necessary order, and schedules the tasks and sub-tasks according to relative priorities and due dates. By using input data such as work action, the work environment, the materials category, the materials sub-category, and the materials size, the configuration process assigns resources. Supervisors, for example, may be limited in the types and sizes of tasks that they do and the configuration process assigns the supervisors their specific jobs.

A pricing application receives the output of the job entry application. The pricing application assigns prices to the tasks and sub-tasks and also obtains necessary approval for the charges. The pricing application provides its output to a budgeting system associated with the company.

A scheduling application also receives the output from the pricing application. The scheduling application uses this data to prioritize work activities. It has information on the work schedules of personnel and is able to schedule the tasks to the available personnel based on availability. It will take in to account vacation days and week ends along with holidays 5 and other non-scheduled work days. The normal schedule days are entered and edited in the Workstation Module.

A materials management application manages the materials requirements of the various tasks. The materials management application determines the materials available from inventory, orders the appropriate materials from outside vendors or from other sites 10 within the company, and tracks usage of the inventory. The materials management application also determines when the materials are needed based on the scheduling dates and orders the materials in advance after considering the delivery time associated with the materials. The materials management application provides its output to asset management systems within the company, such as its accounting system.

15 A workstation application within the OSPCM provides an interface by which time reporting personnel of the company can enter their time and arrange their work schedules directly with the OSPCM system. The personnel also report the completion of tasks in the OSPCM system.

A billing and reporting application within the OSPCM provides an interface to the 20 contractors. Through the billing and reporting application, the contractors receive work and billing expectations, enter completions and/or changes to billing expectations. All information can be printed or saved to the contractors accounting system. The billing and

reporting application compares the completed task to the design and sends any variations to a supervisor for approval (CIBE) change in billing expectations. Upon approval of a CIBE or if the work item did not vary from the design, the billing and reporting application prepares the invoice for payment.

- 5 An inspections application determines which ones of the tasks that have been marked as completed should be sampled and marked for inspection. The inspections application generates the inspection schedules and manages results of the inspections. The inspection application further receives input from company supervisors and contractors in the event that the inspection fails, such as input related to a contractor's appeal, revisions to the task, or contractor's acceptance of a failed inspection.
- 10

A management reports application provides the ability to generate and view various reports. These reports are accessed throughout the OSPCM process by the various applications.

## BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and form a part of the specification, illustrate preferred embodiments of the present invention and, together with the description, serve to explain the principles of the invention. In the drawings:

5 Fig. 1 is an overall process flow according to a preferred embodiment of the invention;

Fig. 2A is a prepare bid package process flow performed by a bid and award application shown in Fig. 1;

10 Fig. 2B is an award bid process flow performed by the bid and award application of Fig. 1;

Fig. 3 is a contract moves process flow performed by a job entry application shown in Fig. 1;

Fig. 4 is a scheduling process flow performed by the scheduling application shown in Fig. 1;

15 Fig. 5A is an order process flow performed by a materials management application shown in Fig. 1;

Fig. 5B is an inventory process flow performed by the materials management application of Fig. 1;

20 Fig. 5C is a receipt process flow performed by the materials management application of Fig. 1;

Fig. 5D is an assign and transfer process flow performed by the materials management application of Fig. 1;

Fig. 5E is a requirement status and issue process flow performed by the materials management application of Fig. 1;

Fig. 5F is a view order process flow performed by the materials management application of Fig. 1;

5 Fig. 6 is an approval process flow performed by the job entry other application shown in Fig. 1;

Fig. 7 is an inspection census process flow performed by the inspection application shown in Fig. 1; and

10 Fig. 8 is a process flow diagram performed by the OSPCM system in the event of a reorganization within a company.

#### DETAILED DESCRIPTION

Reference will now be made in detail to preferred embodiments of the invention, non-limiting examples of which are illustrated in the accompanying drawings.

15

#### I. OVERVIEW OF PREFERRED SYSTEM AND METHODS

With reference to Figure 1, processes and systems according to preferred embodiments of the invention will now be described. One process according to the invention comprises an Outside Plant Construction Management (OSPCM) process that accesses a number of tables 10 through 18. At 10, the core staff builds OSPCM tables through the assistance of a reference editor 11, location editor 12, operations profile editor 13,

configuration editor 14, core staff job entry 15, core staff material 16, core staff job entry 17, and holiday editor 18.

The OSPCM process begins at 21 with a regional contracts application. The regional contracts application 21 provides uniform terminology throughout various contracts. For instance, a contract item of burying cable may be contract item 101A and is the same for all contractors.

At 23, a bid and award application is used for both the bidding of contracts and the awarding of them. The bid and award application tracks each contract work item (CWI) for each contractor per contract. Thus, for existing contracts, the OSPCM system has reliable historical information from which an accurate bid may be fabricated. For instance, the OSPCM system can accurately estimate the number of 30 foot poles, 40 foot poles, and 50 foot poles placed by a specific contractor in a specific area for a specific time period.. Based on this information, the OSPCM system generates a bid that is sent to the contractors and the contractors include their pricing and other information to the bid. Based on the information already within the OSPCM system, the bid provided to the contractors is returned and input into the OSPCM system. The OSPCM system then provides a view of all of the bids that have been received and allows these bids to be compared to each other so that the contractor with the most desirable bid can be awarded the contract.

At 26, a job entry application is used to enter job details and to configure the job. An engineer or other person within the company draws up the job on blueprints and inputs all of the work tasks that need to be performed. The entry of job details also includes detailing all of the material that is needed to perform the job and any service commitments and due dates.

A configuration process is also performed at 27. The configuration process reads the tasks involved in a job and groups the tasks into scheduling activities. The configuration process assigns standard time increments for the jobs, sequences the work depending upon which tasks need to be performed prior to other tasks, and creates desired schedule dates for the 5 jobs based upon due dates and relative priorities. For example, the configuration process sequences the placing of poles prior to placing cable and ensures that the cables are in place prior to scheduling the task of splicing the cables. The configuration process also assigns the correct resource to each scheduling activity.

At 28, a pricing application assigns costs to each of the tasks. The pricing application places costs on all materials as well as labor. For instance, for placing cable the pricing 10 application multiplies a loaded labor rate times the standard time increment for placing cable and the multiplies times the footage on the cable to come up with the labor cost. The pricing application also adds in engineering overhead and other related cost to arrive at a final price. At 29, the prices are reviewed and are approved, with the level of approval being dictated by 15 the total cost of a job. At 30, the pricing information is provided to a budgeting tool, such as BCAS.

At 31, a scheduling application looks at the available resources and assigns the tasks to the appropriate personnel. The scheduling application, for instance, knows which 20 supervisors are available on certain dates within a certain region and can assign the tasks accordingly to the best-suited person. The scheduling process employs a critical path method (CPM) to ensure that critical due dates are met. For example, if a task needs to be completed by a certain date but cannot be started until a second task is finished, then the scheduling

application will ensure that the second application is completed a sufficient number of days prior to the due date so that all tasks may be completed on time.

At 33, a materials management application manages the required materials for the tasks. The materials management application determines what materials are available from 5 within the RBOC and also determines what materials need to be ordered from outside vendors. The materials management application knows the time it takes to receive the material (shipping interval) once it is ordered and places the order so that the materials are available at the time that they are needed. The major materials are maintained by serial number and all materials are tracked when they are ordered, assigned to a job, and used for a job. The material needs are sent to an order master system 38 which determines whether 10 orders must be placed from within the RBOC or to an outside vendor. The REGIS system 35 and CAPRI system 37 provide interfaces for ordering the materials from either the outside 15 vendor or internally. The asset management system 36 provides an interface between OSPCM and the accounting system for the RBOC.

The OSPCM process then splits into a first path for contractors and a second path for 15 internal jobs. With regard to the contractor path, a billing and reporting application 40 handles an interface with the contractor. At 41, the work order is provided to the contractor and the contractor acknowledges acceptance of the order. At 42, the work order is scheduled 20 to meet the RBOC's work schedule and at 43, after the work was performed, the contractor accesses the OSPCM to indicate that the work has been completed. The OSPCM at 48 determines whether the completed work matches the design in the system. If it does, the OSPCM system verifies the invoice at 49 and sends the invoice to a voucher system which

handles the actual paying of the contractor at 52. If the work does not match the design, then at 50 the contractor's report is sent for approval, such as to a supervisor. The supervisor can approve the invoice, make modifications, or make comments to the report at 50. The billing and reporting therefore ensures that only work orders that were requested and that have been 5 completed are sent for payment. The billing and reporting application eliminates the need for any paper invoices to be sent from the contractor to the RBOC and the need for these paper invoices to be sent between the supervisor and other people within the RBOC.

An inspections application at 44 uses a random sampling process to schedule 10 inspections of completed work tasks. A primary purpose of the inspections application is to provide a mechanism for monitoring the contractors to ensure that the work that they indicated as being completed is actually completed as designed and the billing also is accurate. The results of the inspections are posted at 47 and material and labor reports are generated at 46.

If the work is to be performed by the RBOC, then the work is scheduled at 55. The 15 scheduling and review of the work is performed by the scheduling application. If necessary, the job entry other application invokes a buried service wires application 57 which provides an interface to another contractor via the CAS/CATEWAY 58 and LMOS system 59, which are dispatch systems for installation personnel.

A work station application at 61 provides an interface through which employees may 20 enter their time and for entering tasks that they have completed. The work station application

is used in reporting work and noting added, changed, or deleted tasks at 62. This information is provided to the payroll system MTR at 64.

The completed tasks and jobs, regardless of whether they follow down the contractor path or the internal Telco supervisor path, are reported so that at 66 the master plan for a job 5 may be updated. Also, materials are dispersed at 65 and are reported to the asset management system at 67. The OSPCM system also provides a management reports application 69 for providing various management printouts and reports at 70.

## II. REGIONAL CONTRACTS

10 Reference is made to the Appendix of this application for additional description of the regional contracts application. In general, the regional contracts application provides uniformity in terminology between all contractors. Each of the contractor work items (CWI) consequently are coded in the same manner, such as 101A for burying cable. The output of the regional contracts is provided to the bid and award application in generating bids for 15 prospective contractors.

## III. BID AND AWARD

Reference is made to the Appendix of this application for additional description of the bid and award application. The bid and award application provides support in the contract 20 itself, potential contractors with associated information, and some company parameter maintenance to administer the bidding and awarding of contracts. With regard to the contract

itself, the bid and award application defines the contract and specific attributes or fixed variables about it. These attributes include such data as the geographical area that the contract covers and specific CWI codes associated with the contract.

After the contract is defined, the contract has a life cycle with a beginning, a 5 termination, anniversaries, adjustment periods, extensions, and expiration. Changes may be made to the contract throughout its life cycle which are monitored and managed by the bid and award application. An existing contract will have a contractor associated with it and prices for each CWI may have periodic adjustments which may be manually or automatically made by the bid and award application. The bid and award application also includes 10 definitions of each contractor that the company may consider and or contract with to perform tasks. The definition of the contractors will include the types of contracts that the contractor can work and where they can work on, and also license, insurance, financial, and security information.

As contractors are given contracts, the bid and award application establishes billing 15 offices for handling day-to-day invoicing and payment activity. The bid and award application also maintains government price increase construction (PIC) figures, company PIC figures and inspection pools. The PIC figures are used by the bid and award application and the automatic price adjustment processes. The bid and award application uses the inspection pools to define a geographic area in which to monitor the performance of a 20 contractor and to establish some of the parameters for inspection of the contractor's work.

With reference to Figure 2A, the bid and award application will be described in more detail. At 100, the regional contracts application provides a contract template at 101. At 102, a bid package is assembled using CWI usage tables 103 and contractor information 104 contained within databases. Assembling the bid package entails editing documents at 105, 5 assembling documents at 106, preparing CWI worksheets at 107 and selecting prospective bidders at 108. The bid package is built at 109, encrypted to a disk at 110, and placed on a diskette at 111. The bid package is also printed at 114, the bid status is updated at 112, and the bidders are updated in a database at 113. The contractor at 115 receives the bid package, either through the diskette or through the printed package. The contractor at 116 un-encrypts 10 the disk and inputs CWI prices at 117 and signs a cover letter for the bid at 118.

With reference to Figure 2B, the bid information is prepared at 120 and is encrypted to the bid disk at 122. At 121, the bid disk is sent back to the RBOC which un-encrypts the disk at 123 and compares the various bids at 124. The bid comparison entails reviewing contractor bid CWI price worksheets, review contractor authorization pages at 126, and review any 15 articles or exhibits to the bids at 127. At 128, decisions are made as to whether to recommend a particular bid, award the bid, or refuse a particular bid. The bid status is updated at 129 and the updated information is stored in a database at 130. If a bid is awarded, as determined at 131, then the awarded bid information is saved to a database at 132 and is available to the other OSPCM applications at 133. At 134, the contractors that did 20 not receive the award are notified by the OSPCM system.

#### IV. JOB ENTRY

Reference is made to the Appendix of this application for additional description of the job entry application. The job entry application performs a configuration process that determines the type of work on a task or sub-step and assigns a resource. The configuration process also groups the work into logical groups called scheduling activities and then places the scheduling activities in a sequence based on the scheduling sequence codes. The configuration process establishes a date type such as start or completion dates, crew size, a priority, and completion date for the entire scheduling network based on user input or default time periods. The job entry application in performing the configuration process also establishes desired start and end dates on each scheduling activity using the critical path method (CPM).

A process performed by the job entry application called contract move will now be described with reference to Figure 3. At 150, the job entry application reviews the contract details and at 151 determines whether there has been a change, addition, or deletion of a CWI. If there has been, then at 152 the job entry application performs the necessary add, change, or deletion of the CWI. If not, then at 153 the job entry application determines whether jobs need to be moved to a contractor and, if so, moves the job at 155. Moving the job by the job entry application entails moving the jobs at 156, assigning sub-steps to the new contract at 157, and assigning associated CWIs at 158. If jobs do not need to be moved to the contract, and if sub-steps need to be moved to the contract, then the job entry

application moves the sub-steps at 159. The job entry application assigns sub-steps to the new contract and assigns associated CWIs at 161.

5        **V. PRICING**

Reference is made to the Appendix of this application for additional description of the pricing application. The pricing application associates prices with each sub-steps materials, labor, engineering, and contractor resources. The pricing application provides a user with the ability to view reports on-line and to add miscellaneous costs that were not captured during the encoding process by the pricing application. These miscellaneous costs include miscellaneous material, retirement, labor, contractor, engineering, and other costs. The pricing application also provides various reports, such as a report on a detailed price for a job. The pricing application may also provide a detailed construction details report that allows a user to view a list of the pricing reports that have been run for a specific job.

15        **VI. SCHEDULING**

Reference is made to the Appendix of this application for additional description of the scheduling application. The scheduling application also contains the ability to adjust information on scheduling networks. This information includes desired completion dates, crew size, resource groups and priorities. This information is used to establish CPM dates and prioritize the activities. The OSPCM system provides a user with the ability to move work tasks from one activity to another and to change the sequence of work by changing the

activity dependencies. The user also has the ability to manually move work into or out of the schedule within week one or week two and can lock down work so that the scheduling process will ignore resource availability when scheduling the locked down activity. The

5 scheduling application provides scheduling reports and graphs, including individual schedules for each resource group. The scheduling application creates a schedule for each resource group, such as a supervisor group, and contains work for 20 weeks. The scheduling application will not schedule work on a date that has passed and no work is scheduled in weeks beyond 20 weeks. The scheduling application preferably performs a batch process that runs on Saturday nights but can alternatively be run at the user's discretion. The

10 scheduling application creates a priority list of scheduling activities based on adjusted CPM start and end dates, priorities, date types, and activity dependencies. The application adjusts the CPM dates so that when the scheduling process runs, no activity will be scheduled in the past. For example, if the application executes the scheduling process at night, then the earliest scheduled start date for any activity will be the next day.

15 The scheduling application creates resource availability tables for each work group or resource pools. The scheduling application uses a worker profile for each worker that identifies the number of hours per day and the days per week that the worker is available. The scheduling application also uses any vacation time, training time or other miscellaneous off-time. After establishing the priority list and the resources availability tables, the

20 scheduling application schedules the all activities based on the available resources for the CPM dates. If resources are not available for a particular CPM date, then the OSPCM

system moves the activity out in the schedule until resources can be found. All activities are scheduled from the priority list in order even if resources are not available on the CPM dates.

A process performed by the scheduling application will now be described with reference to Figure 4. The output of the job entry application at 170 is provided to a configuration process at 171. The configuration process, as described above, performs the necessary grouping of tasks into activities, sequencing, and prioritizing according to due dates and schedules. The configuration process determines resource group and crew size at 172 and assigns standard time increments to the tasks at 173. The configuration process determines sub-step contract items at 174, determines sub-step contract work items at 175, and creates a scheduling activity at 176. At 177, the configuration process creates scheduling network and assigns key dates and at 178 establishes CPM dates. The scheduling application at 180 performs a batch process at 179. The batch process establishes CPM dates at 181, prioritizes scheduling activities based on adjusted CPM start and end dates at 182, creates schedules for each resource group at 183, and creates resource availability tables for each resource group at 184.

## VII. MATERIALS MANAGEMENT

Reference is made to the Appendix of this application for additional description of the materials management application. The materials management application ensures that material requirements are met for all jobs. All new material is obtained through a real-time interface with the order master, which is the front-end interface to REGIS and CAPRI. All items with a product identifier are sent from the order master to REGIS to be fulfilled, preferably from within inventory. All non-product identified items are sent from the order master to CAPRI to be fulfilled by an outside vendor. The materials management application calculates the order date, identifies the requirements of today, orders material requirements, views an order, receives shipment details, receives ordered materials, sends receipt notification to CAPRI, and sets preferences.

The materials management application also satisfies material requirements on jobs with existing inventoried materials. The materials management application may satisfy a materials requirement with inventory, may execute a transfer request from another site, and also acknowledges receipt of transferred materials. The materials management application manages inventory on various levels. The materials management application performs the following functions: view a jobs material requirements, issue material needed on a job, view an inventory item, view assignments, junk an inventory item, split a reel of cable, adjust an inventory balance, change the status of an inventory item, exempt an inventory item, return an inventory item, transfer an inventory item, relocate an inventory item, add an inventory

item, view issues, view material inventory transactions, run an inventory scan, process material usage, report material inventory transactions to asset management system, and report reconciliation file to the asset management system.

The materials management application can also be used to gain consensus on how 5 material requirements are handled when changes are made to a sub-step. These changes include changes that indicate that the material requirement is no longer needed either because the job or sub-step was deleted, changes to the description of the material required on the sub-step, changes to the custom features required on the sub-step, such as creating, updating, or deleting custom features, or changes to the quantity of material required on the sub-step.

10 The materials management application is also used in combination with the management reports application to generate various reports. These reports include order reports, transaction reports, issue summary reports, major material activity reports, material notification reports, over-age material reports, and investment management reports.

15 Exemplary processes performed by the materials management application will now be described with reference to Figures 5A to 5F. At 200, the materials management application determines the requirements needed for a job. At 201, the materials management application selects the requirements for an order and generates the order for the job at 202. The order is generated after considering aggregation, custom features, group order requirements, and shipping to alternate addresses. The order is sent to the order master process at 204 and the 20 order master at 205 performs the order. At 206, the materials management application checks to see whether the order was successful and, if it is, receives a “Q” number at 207. If

the order was not successful, then at 208 the materials management application views and fixes the order master errors and generates the order at 202.

An inventory process performed by the materials management application will now be described with reference to Figure 5B. The materials management application maintains an inventory of all items at 210. The materials management application provides outputs to the asset management system at 211, to a material usage process at 212, and determines whether inventory needs to be added at 213. The materials management application at 214 enables wild card searches, searches based on serial number, material description, inventory site, or CMC. Through its inventory process, the materials management application shows/releases assignments at 215, junks or discards inventory at 216, splits a reel at 217, 10 adjusts balances at 218, changes the status at 219, indicates exempt status at 220, return status at 221, records transactions at 222, transfers at 223, and relocates at 224.

A receipt process performed by the materials management application will now be described with reference to Figure 5C. The materials management application receives an order at 230 and executes a receipt process at 231. At 232, the materials management application indicates receipt line items, line item details, unreceipt line items, and complete orders. The materials management application provides an output to the CAPRI system at 233 which authorizes payments to the vendors at 234.

An assign and transfer process performed by the materials management application will now be described with reference to Figure 5D. At 240, the materials management application determines the needed requirements for a job. At 241, the materials management

application determines whether or not these needs can be met by existing inventory, and if so, assigns the material from the existing inventory to the job at 242. If the requirements cannot be met by existing inventory, then at 243 the materials management application scans inventory using search criteria. These search criteria, as indicated at 244, include state, 5 CMC, all inventory sites, selected inventory sites, maximum records displayed, and material descriptions. A transfer request is executed at 245 by the materials management application and at 246 the materials management application determines whether the transfer is approved. If the transfer is not approved, then the materials management application scans inventory at 243. If the transfer is approved, then at 247 the materials management 10 application receives the transferred material and performs a receipt transfer process at 248. The receipt transfer process receives receipt line items and also cancel transfer requests at 249 and also the approval, rejection, or canceling of transfer requests from other sites at 250.

A requirement status and issue process performed by the materials management application will now be described with reference to Figure 5E. At 252, the materials 15 management application determines the requirements for a job. The materials management application determines the requirements by viewing the requirements, determining the requirement status, showing assignments, viewing orders, viewing transfers, viewing transfer requests, and viewing issues at 253. At 254, the materials management application issues the materials to the job at 254.

A view order process performed by the materials management application will now be 20 described with reference to Figure 5F. At 260, the materials management application

performs an order summary process. At 261, the materials management application views the order process based on the order master number, purchase order number, select ticket number, and job number as displayed at 263. At 262, the materials management application provides a summary for the order, including line items at 264, order options at 265, order 5 remarks at 266, and ship to information at 267.

## **VIII. JOB ENTRY OTHER**

Reference is made to the Appendix of this application for additional description of the job entry other application. The job entry other application performs processes to 10 automatically authorize and approve contractor work tasks. The work tasks are authorized if an individual logged on has the proper authority level. If a higher level is required, the job entry other application notifies the user and provides an ability for such approval. The job entry other application tracks completed work to ensure that continued correct approval levels are maintained throughout the process. The job entry other application creates tables 15 to set the allowed dollar approval limits for each management level for the type of work in process. The job entry other application also calculates the estimated dollar values of the proposed work task and uses this value to determine if the individual has the correct approval level.

An approval process performed by the job entry other application will now be 20 described with reference to Figure 6. At 280, the job entry other application performs the function of approving jobs. The estimated dollar value of the work is calculated at 282 and is

encoded at 281 and dollar levels are provided to the job entry other application. The job entry other application uses management level dollar approval limit from the employee editor at 283 and determines at 284 whether the logged-in user has the proper approval level. If the user does, then the job is automatically approved at 285 and the total estimated dollar amounts for approval are stored in a database at 286. If the user does not have the proper approval, then at 287 the job entry other application contacts the next level supervisor for approval.

## IX. BILLING AND REPORTING

Reference is made to the Appendix of this application for additional description of the billing and reporting application. In general, the billing and reporting application provides an interface to the contractors through which they can accept work orders and view their schedules so that they may complete the jobs to meet appropriate due dates. After the job is completed, the contractors indicate the job as completed through the billing and reporting application and initiate a payment process. The billing and reporting application compares the completed jobs against the stored design and routes discrepancies to supervisors or other appropriate personnel for approval. In the event that the supervisor does not approve of the job that the contractor indicated as being completed, the billing and reporting application provides interfaces to the contractor and to the supervisor to come to a resolution. The billing and reporting application works in conjunction with the inspections application to oversee the contractors.

## X. INSPECTIONS

Reference is made to the Appendix of this application for additional description of the inspections application. The inspections application manages the inspection process of contractors and managers. The inspection application is involved in the following areas: 5 inspection generation which may be either consensus or sample, reports, logging results, notification of failures, approvals, billing adjustments, management reporting, and contractor ratings.

An inspections census process performed by the inspection application will now be described with reference to Figure 7. At 300, a job is indicated as completed, and at 301 the 10 inspection application performs sampling. The inspection application uses the CWIs, crew numbers, and CMC at 304 to creates census information at 303. The inspection application may also create default census items for the sampling and also for the census information at 302. The inspection application generates inspection records at 305 and determines whether 15 to download the inspection records at 306. If the inspection records should be downloaded, then at 307 the records are downloaded and are otherwise printed at 308.

At 309, the inspections are performed to ensure that the work that has been indicated as being completed was actually performed. If the inspection records were downloaded, then 20 at 311 the inspector enters the inspection results and uploads the results to the inspection application. If the inspection records were printed, then the inspection results are entered on the records and provided to personnel for entry into the inspection application. The

inspection is based on bid and award equality and billing fee amounts as indicated at 310. A determination is made at 313 as to whether the job passed or failed the inspection and records are updated appropriately.

For passed inspections, the inspection application sends the completed task to the invoicing process at 318 and the billing and reporting application performs its processes at 319. For inspections that failed, the contractor can accept or appeal at 314. If the contractor appeals, then at 315 a resolution is attempted between the contractor and the Telco. At 316, rework may be invoiced in which case the contractor would need to perform this work if applicable. If the contractor accepts the failed inspection, then the work item is sent to second level manager for approval and/or adjustments at 317.

## XII. WORKSTATION

Reference is made to the Appendix of this application for additional description of the workstation application. In general, the workstation application provides an interface by which personnel within the company can enter their time and control their schedules. The personnel, for instance, can enter the time that they have worked as well as other time, such as vacation and training times. Through the workstation application, the personnel within a company also mark tasks as being completed. The information obtained from the workstation application is useful in dispersing time and materials promptly upon completion of tasks and in determining available resources. As discussed above, the scheduling application relies upon this type of data in scheduling jobs.

## XI. MANAGEMENT REPORTS

Reference is made to the Appendix of this application for additional description of the management reports application. The management reports application and the materials management application provide various reports on the OSPCM system and process. For instance, the management reports application provides an investment management report that provides an index measuring how efficiently inventory is managed. The index describes how much inventory was owned over a given period of time and how much it cost the company to own that inventory.

The management reports application may generate an issue summary report. The issue summary report contains information about issued material. The report is used to print a list of inventory items that have been taken from the inventory site to the job site.

The management reports application may also generate a major material activity report. The major material activity report contains information about material inventory transactions that involve movement in and out of inventory, excluding order receipts, transfer receipts, and disbursements. The report is designed so that a manager is aware of the transaction activity that occurs within an area for which he or she is responsible. Any abnormal activity is investigated.

The management reports application also generates a material notification report. The material notification report contains information about the inventory items currently assigned to a job. The report is used to determine the material that is available to begin work.

The management reports application may also generate an order report. The order report contains information about orders having a specified status. The status, for instance, may be ordered, shipped, received, or canceled.

The management reports application may also generate an over-age material report.

5 The over-age material report contains information about material that will be held in inventory over 30 days because of a change in the associated job's schedule. This report includes material that is on order that, once received, will be in inventory for over 30 days before it is used and assigned material that will be in inventory for over 30 days before it is used. The report serves as a warning that the company is in jeopardy of holding inventory for over 30 days which could adversely affect the investment index of the company. The report can be used to reference the inventory items that could be unassigned from the original job and assigned to a job that will be worked earlier or used to reschedule the job again so that the material can be used for its original purpose.

10 The management reports application also generates a transaction report. The transaction report contains information about the transactions of a specified type. The transaction type includes order receipt, assignment, unassignment, inventory status change, inventory addition, inventory deletion, split a reel, transfer, transfer receipt, reclassify to exempt, reclassify from exempt, return, disbursement, remove to good, junk, and recover from junk.

## XII. REORGANIZATION

When organizational changes are made within the company that change boundaries of responsibility within a company, then jobs already in the OSPCM system must be re-assigned to the correct resources. These organizational changes include such changes as state, wire center, or construction management center (CMC) changes. A "Reorg" process within OSPCM does all of the re assigning of work to the appropriate areas without someone having to manually change every job.

A reorganization process according to a preferred embodiment of the invention will now be described with reference to Figure 8. A reorganization request is processed at 335 with details of the reorganization request being provided at 336. These details include reports at 338, wire center rename at 339, wire center move at 340, or inventory site move at 341. The reorganization may be a new reorganization request at 331 or an existing reorganization request at 332. The new reorganization request may come from the state, CMC, run date or contact number as shown at 333. The existing reorganization request may come from a request number, state, CMC or run date, as shown at 334. At 337, a decision is made as to whether the reorganization request is approved and, if it is, then a weekly reorganization process occurs at 342. At 343, life run results are reported.

The forgoing description of the preferred embodiments of the invention has been presented only for the purpose of illustration and description and is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Many modifications and

variations are possible in light of the above teaching.

For example, the invention has been described with reference to the management of jobs within a RBOC. The invention, however, may be applied to other types of companies both inside and outside the telecommunication fields. Also, as should be apparent from the 5 description above, the invention is useful both with jobs performed from within a company and also with jobs that are performed by outside contractors. The invention provides additional functionality with outside contractors since it assists in the bidding and awarding of contracts.

The embodiments were chosen and described in order to explain the principles of the 10 invention and their practical application so as to enable others skilled in the art to utilize the invention and various embodiments and with various modifications as are suited to the particular use contemplated.

## CLAIMS

What is preliminarily claimed is:

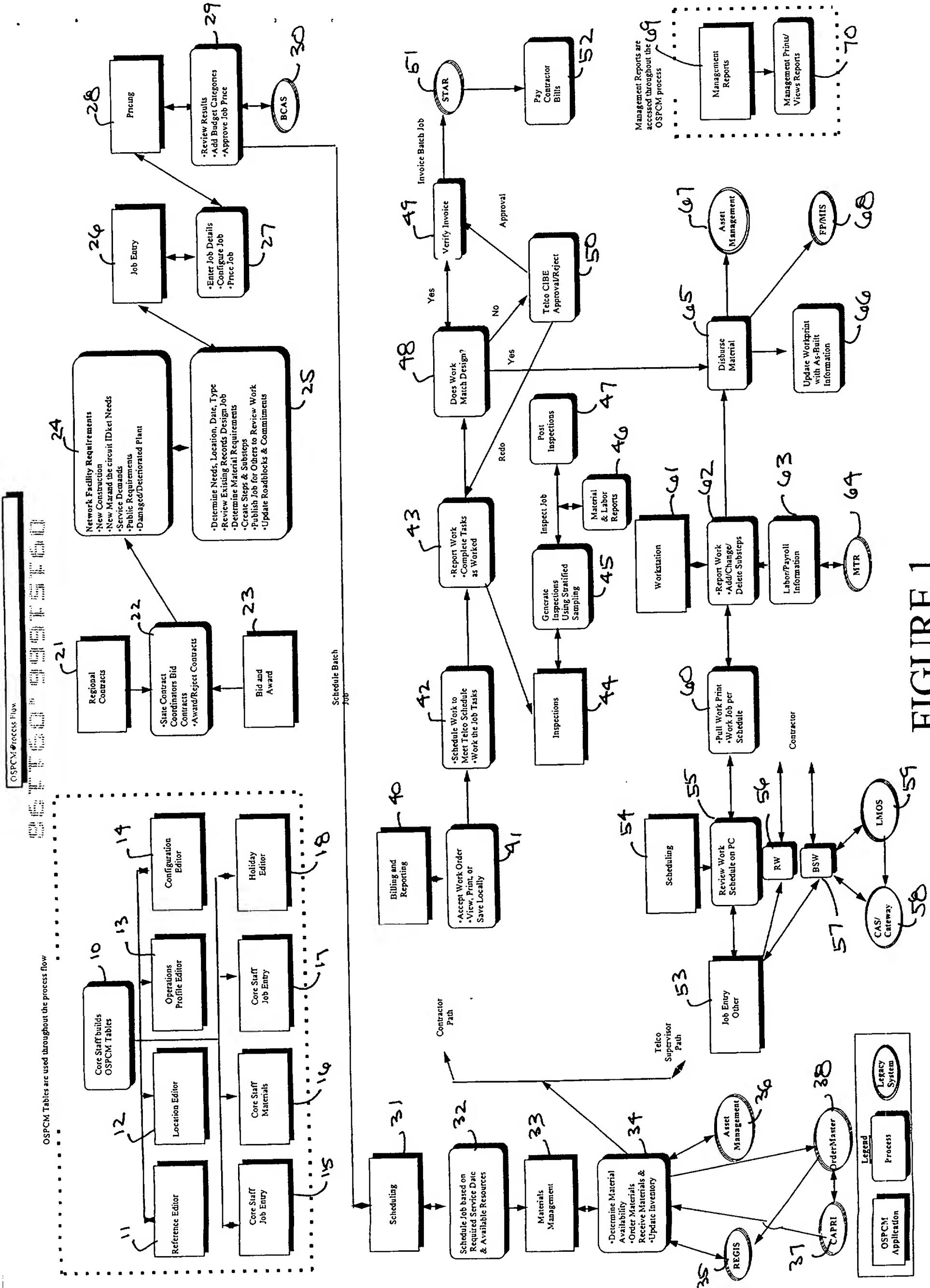
1. A system for performing job management comprising at least one application for performing at least one of the actions described above.
2. A method of performing job management comprising at least one of the actions described above.
3. A computer-readable medium for use storing software for use in performing a method of job management, the method comprising at least one of the actions described above.
4. A system for performing job management, the system including at least one of:
  - a regional contracts application;
  - a bid and award application;
  - a job entry application;
  - a pricing application;
  - a scheduling application;
  - a materials management application;
  - a job entry other application;

a billing and reporting application;  
an inspections application;  
a workstation application; and  
a management reports application.

## ABSTRACT

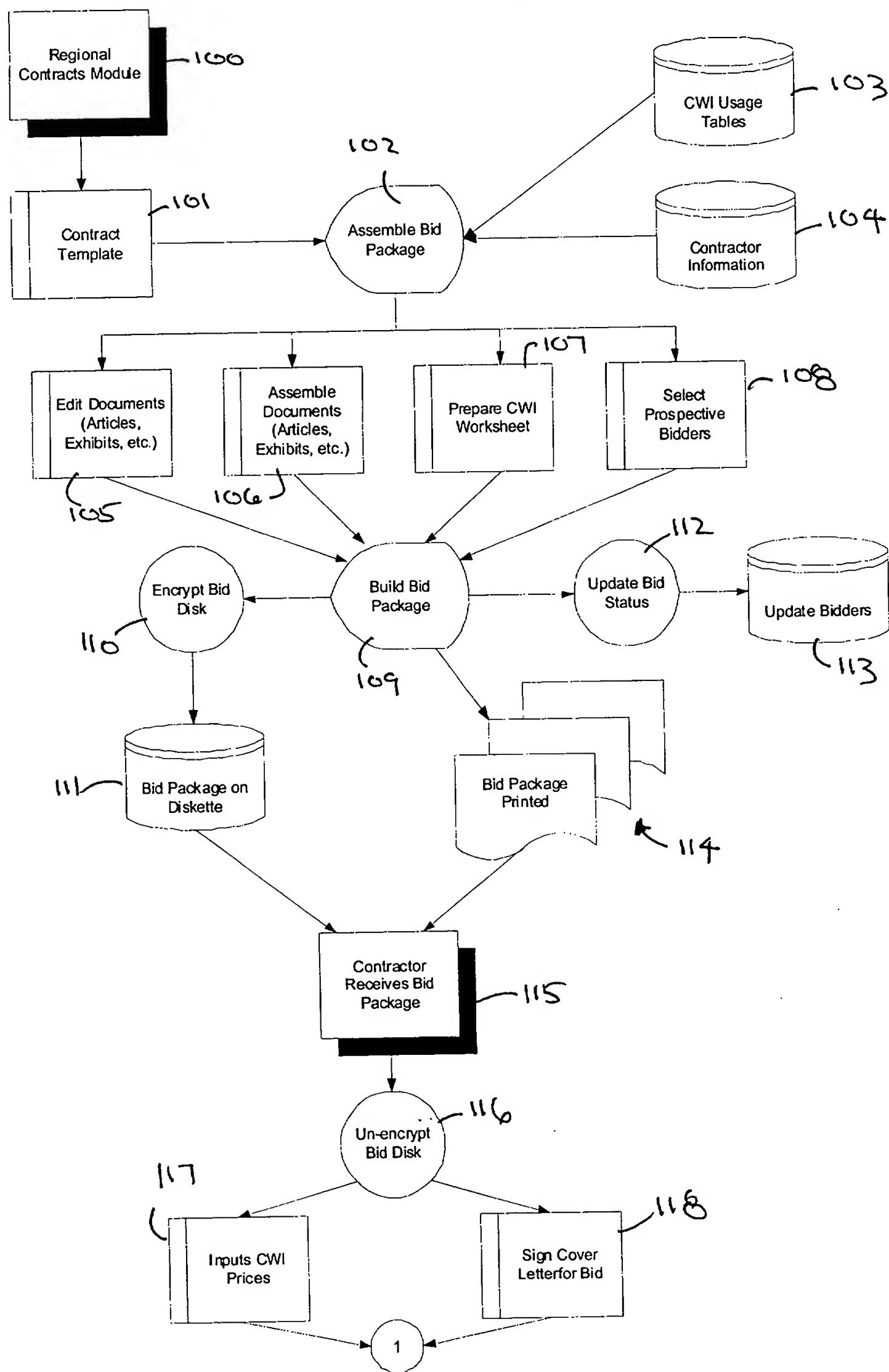
An Outside Plant Construction Management (OSPCM) system simplifies and mechanizes many aspects of operating a facility, such as a Regional Bell Operating Company (RBOC). The OSPCM relies on historical data on similar jobs to generate bids detailing tasks and material needs. The contractors add pricing and other information to the bid and this data is input to the OSPCM system. The OSPCM system performs a configuration function on encoded work to the awarded contract which entails breaking the job into its constituent tasks, sequencing the tasks, prioritizing the tasks, and scheduling the tasks. The OSPCM system completes the scheduling task by assigning the tasks to supervisors and/or to outside contractors. The OSPCM system automatically manages the materials required for tasks by determining what and when it is needed, ordering what is available from within inventory, and ordering necessary materials from outside providers. When a task is completed, the contractor accesses the OSPCM system and marks the task as completed. The OSPCM system then forwards invoices to the voucher system for those cases where work is completed as designed. For work completed with changes in design or billing, files are sent to the supervisor for approval or for disapproval and comments. After a task is approved for payment, the OSPCM system forwards the invoice to a voucher system for payment. The OSPCM system samples completed tasks for inspections and schedules them appropriately. The OSPCM system also handles employee time and payroll, with employees entering time directly into the OSPCM system.

FIGURE 1



# Bid and Award

## Prepare Bid Package



**FIGURE 2A**

## Bid and Award Award Bid

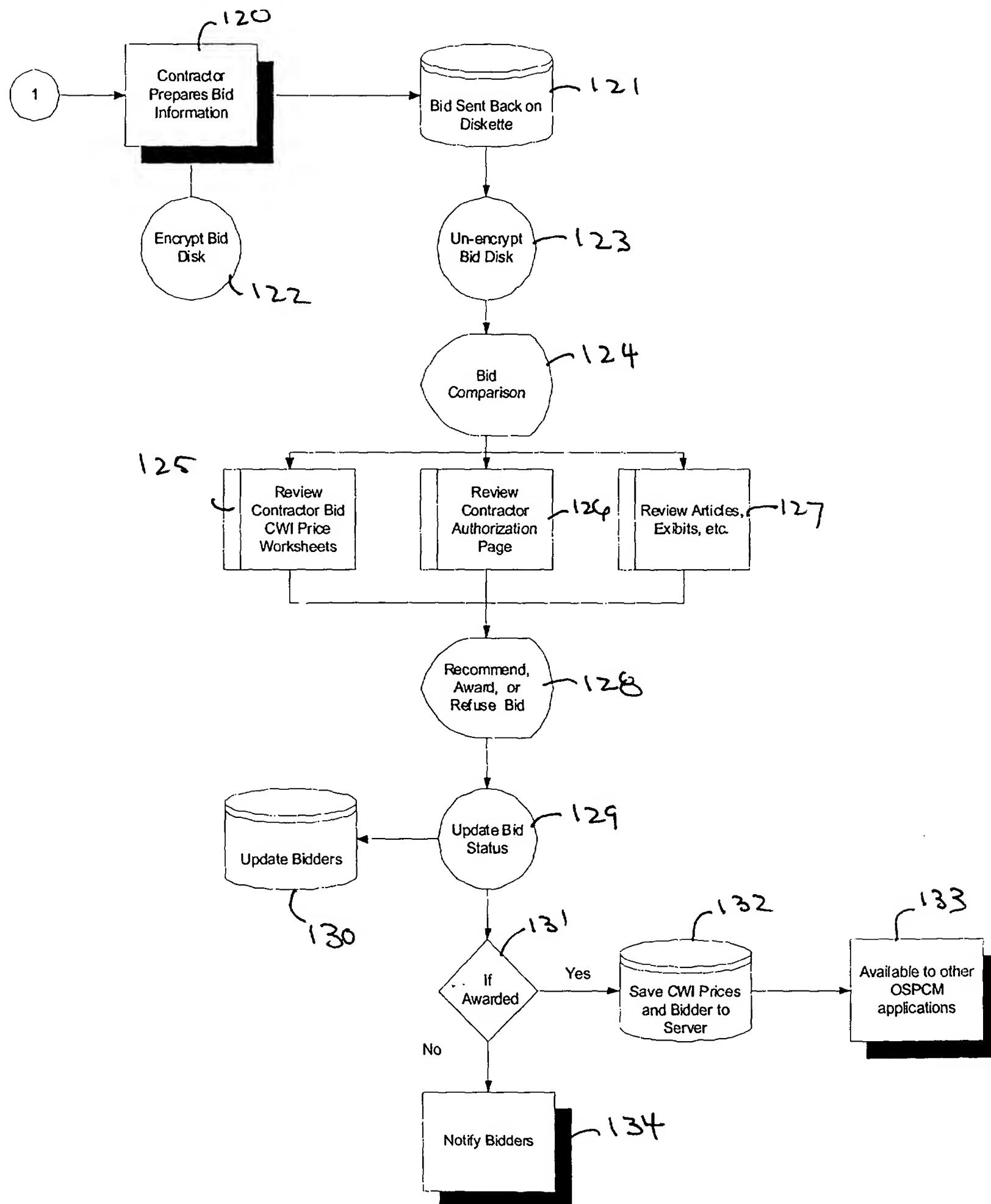


FIGURE 2B

# Job Entry EWO Contract Moves

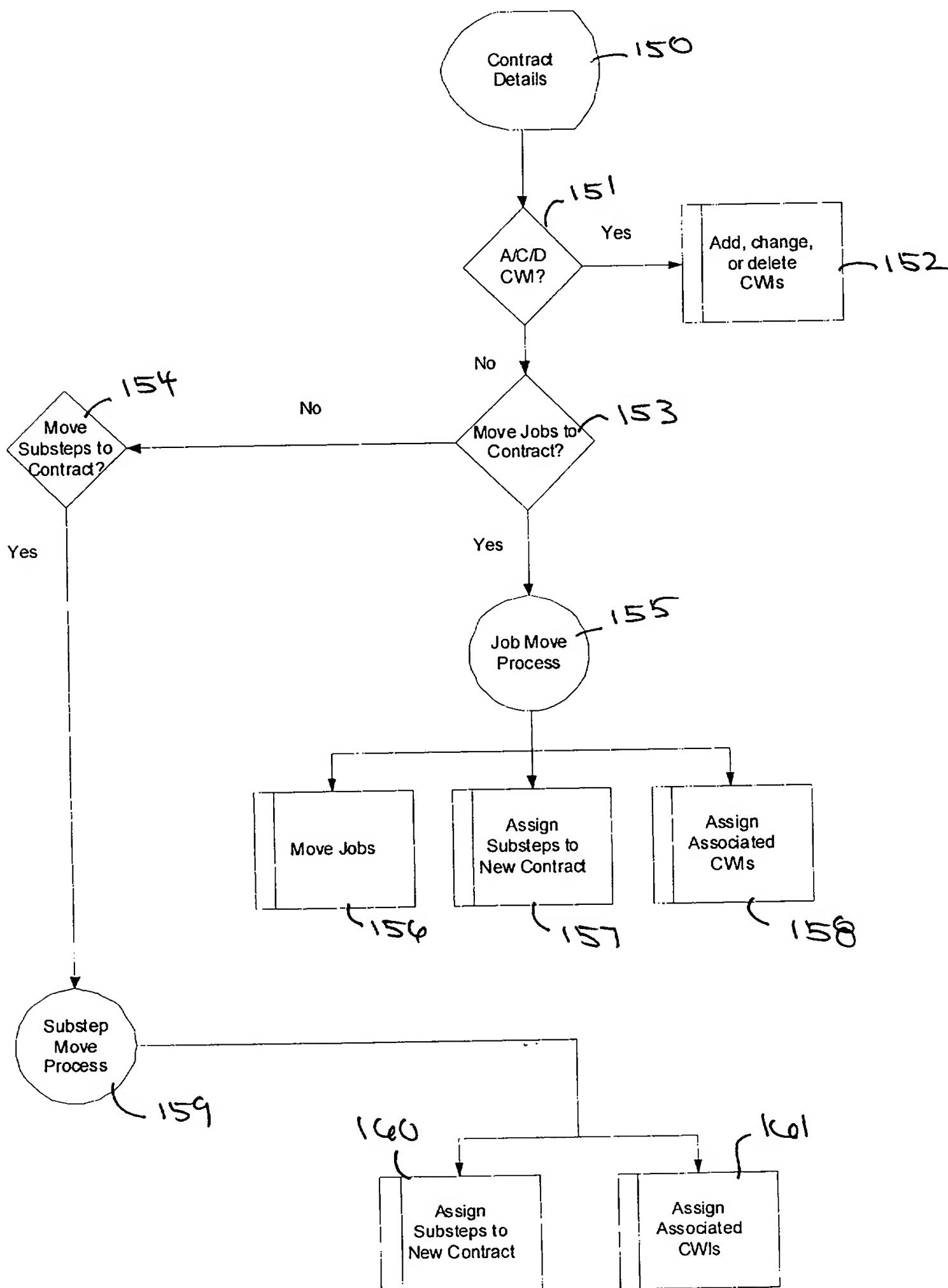


FIGURE 3

# Scheduling

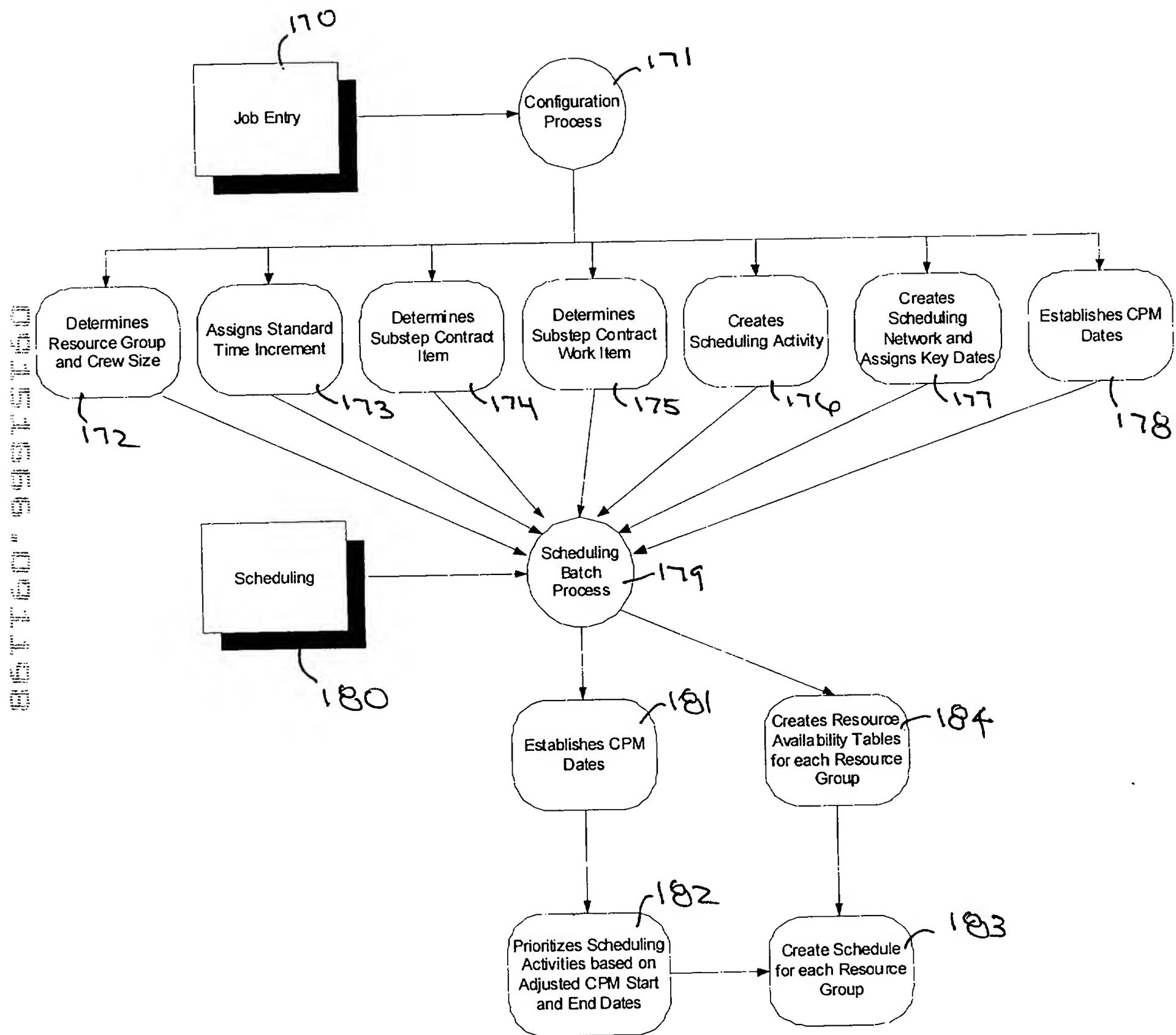


FIGURE 4

## Materials Management Order Process

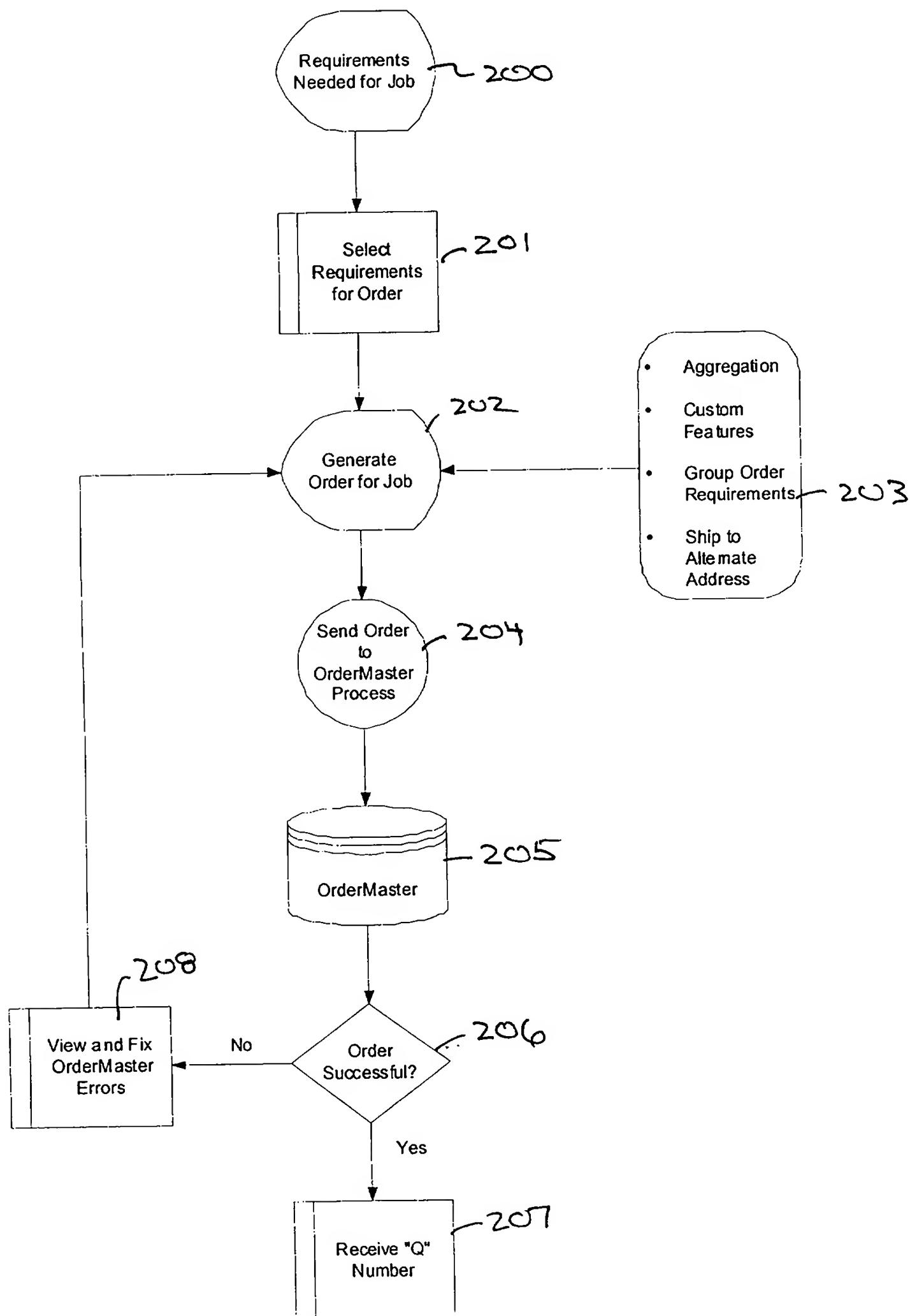


FIGURE 5A

## Materials Management Inventory Process

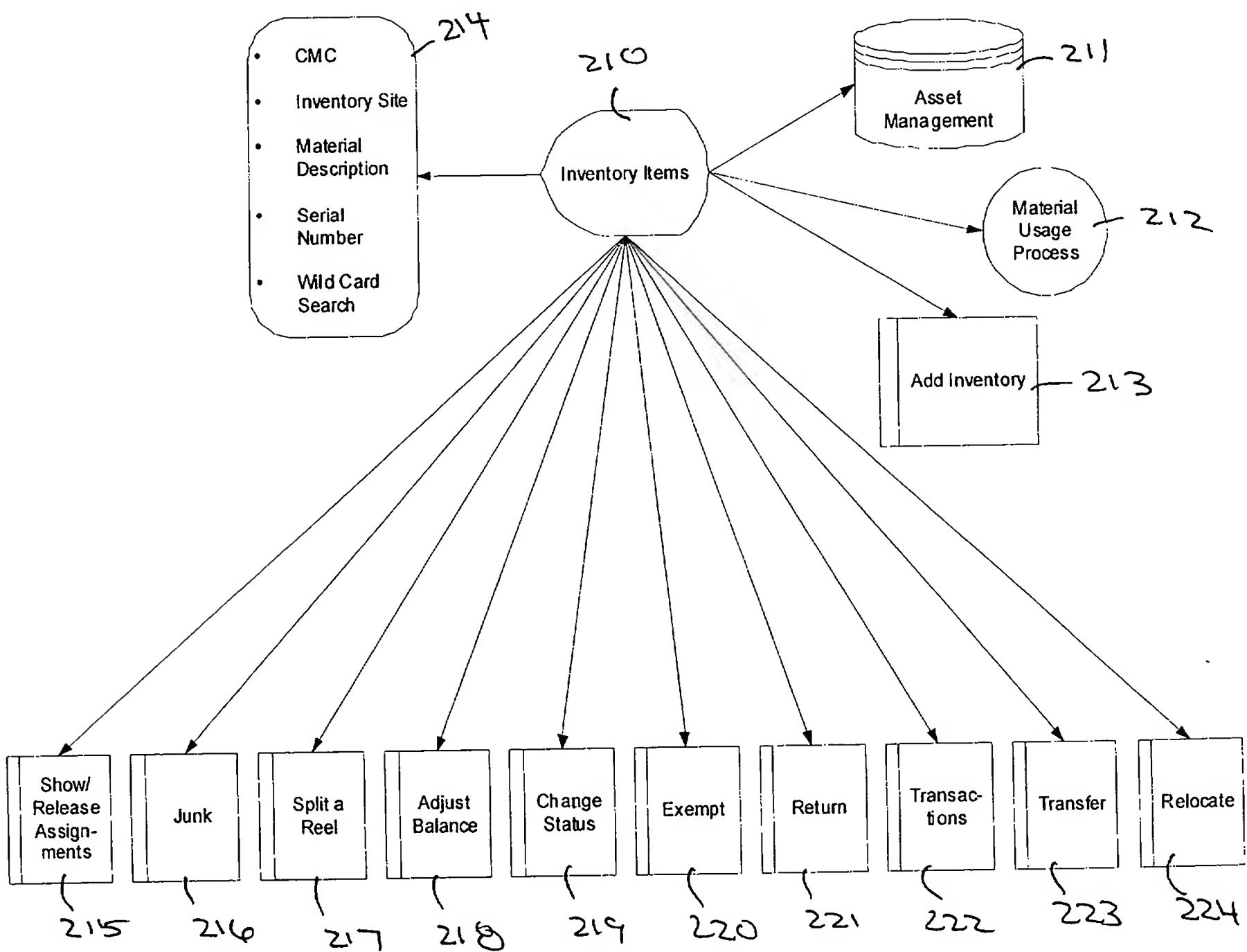
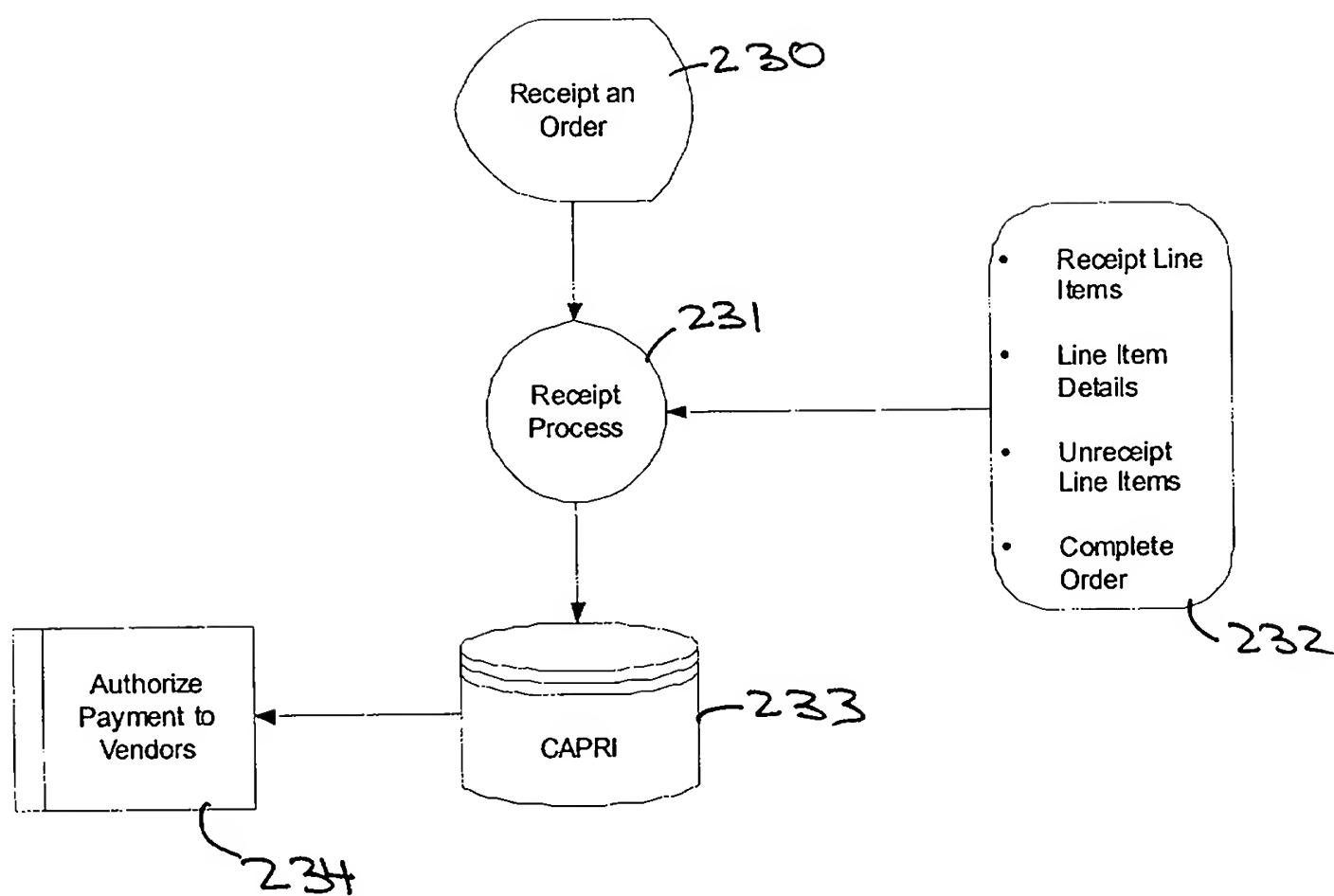


FIGURE 5B

## Materials Management Receipt Process



**FIGURE 5C**

Materials Management  
Assign and Transfer  
Process

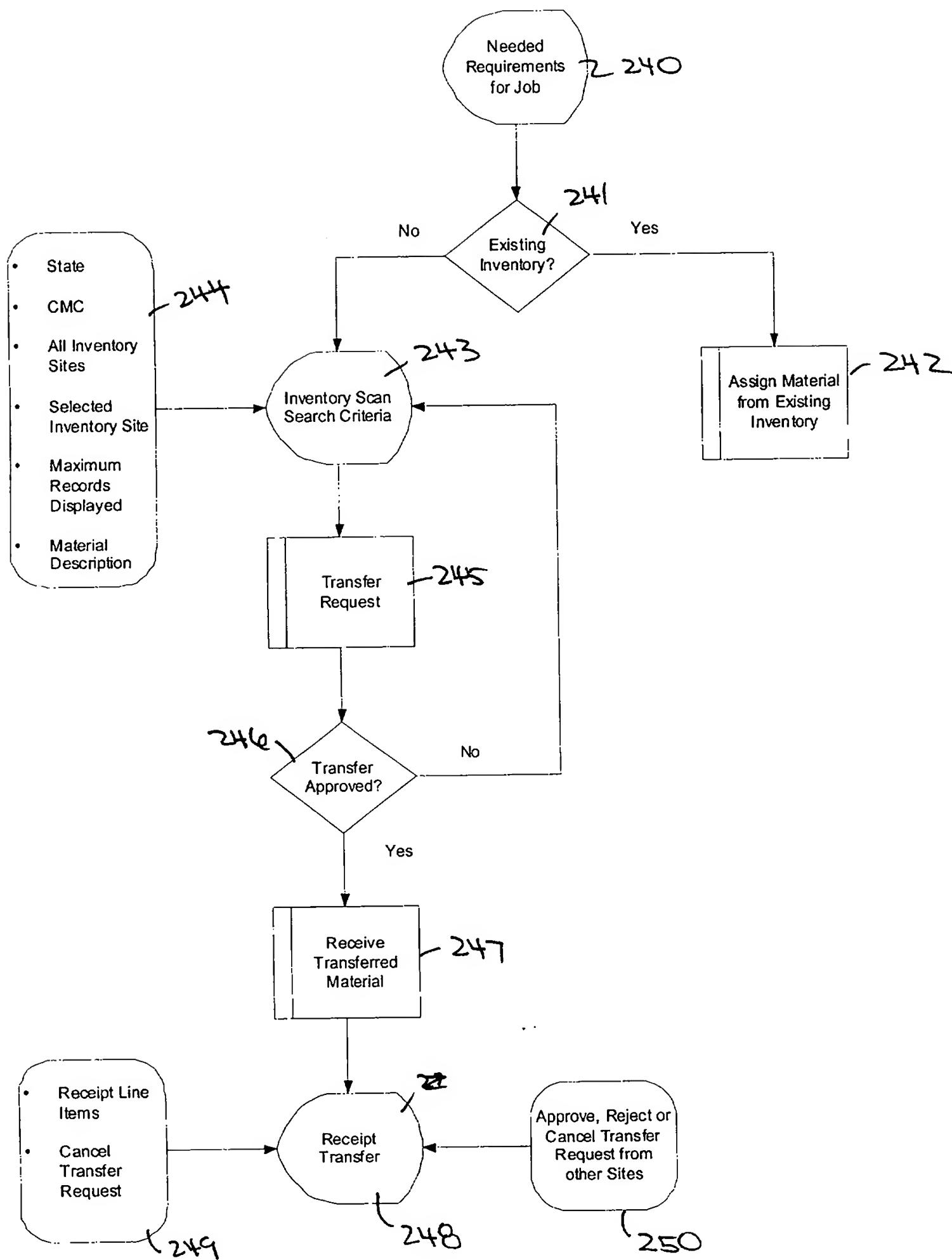


FIGURE 5D

# Materials Management Requirement Status and Issue Process

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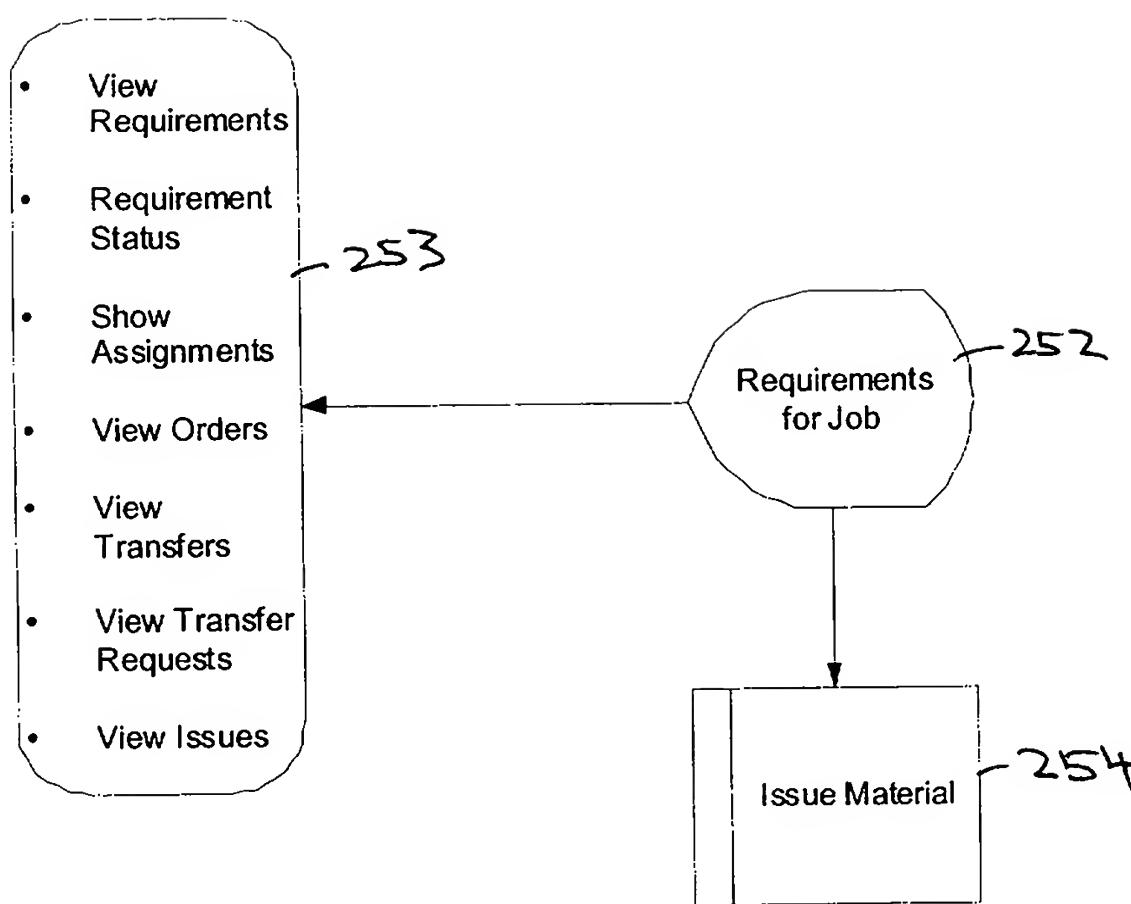


FIGURE 5E

## Materials Management View Order Process

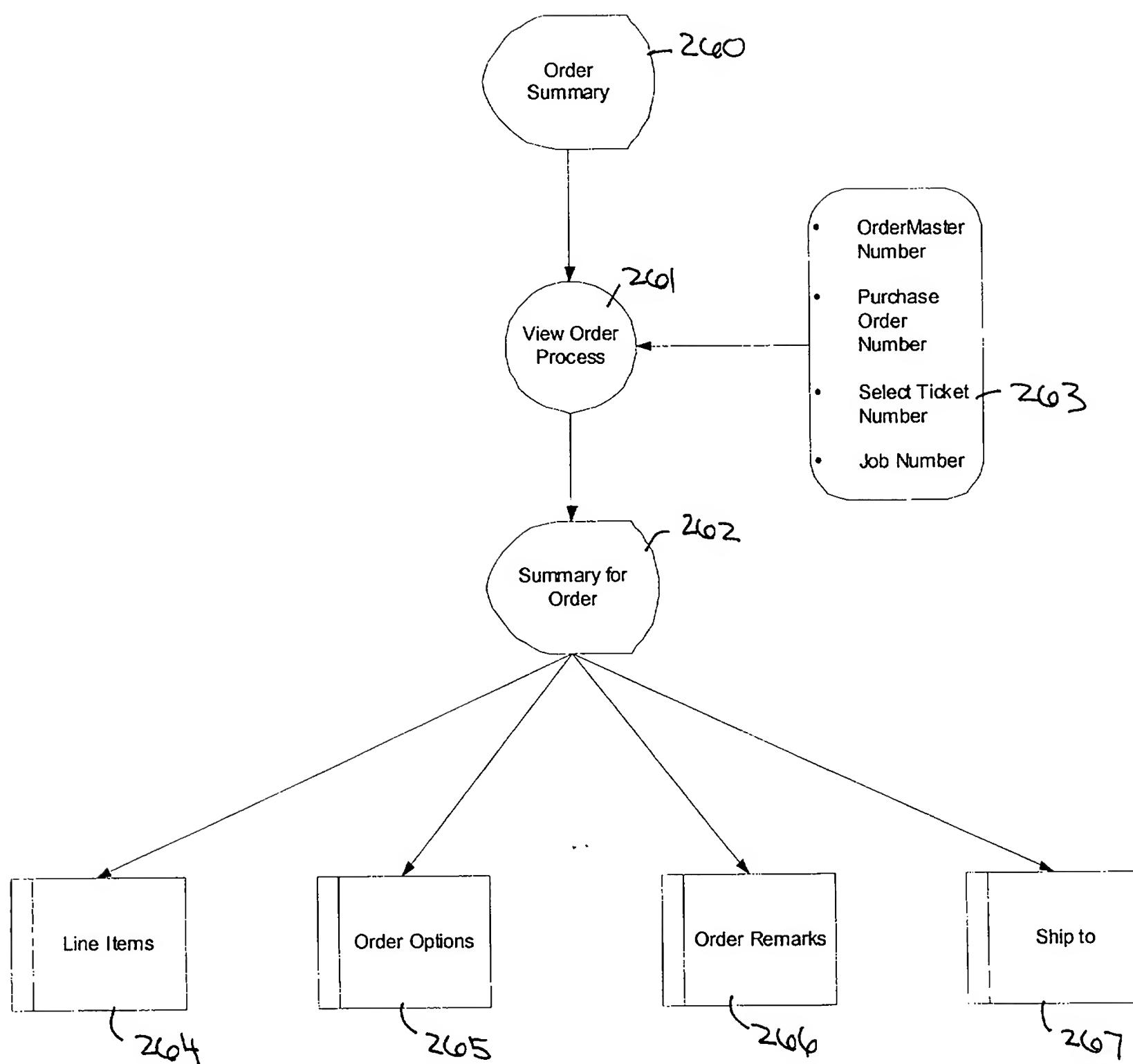


FIGURE 5F

## Job Entry Other - Approvals

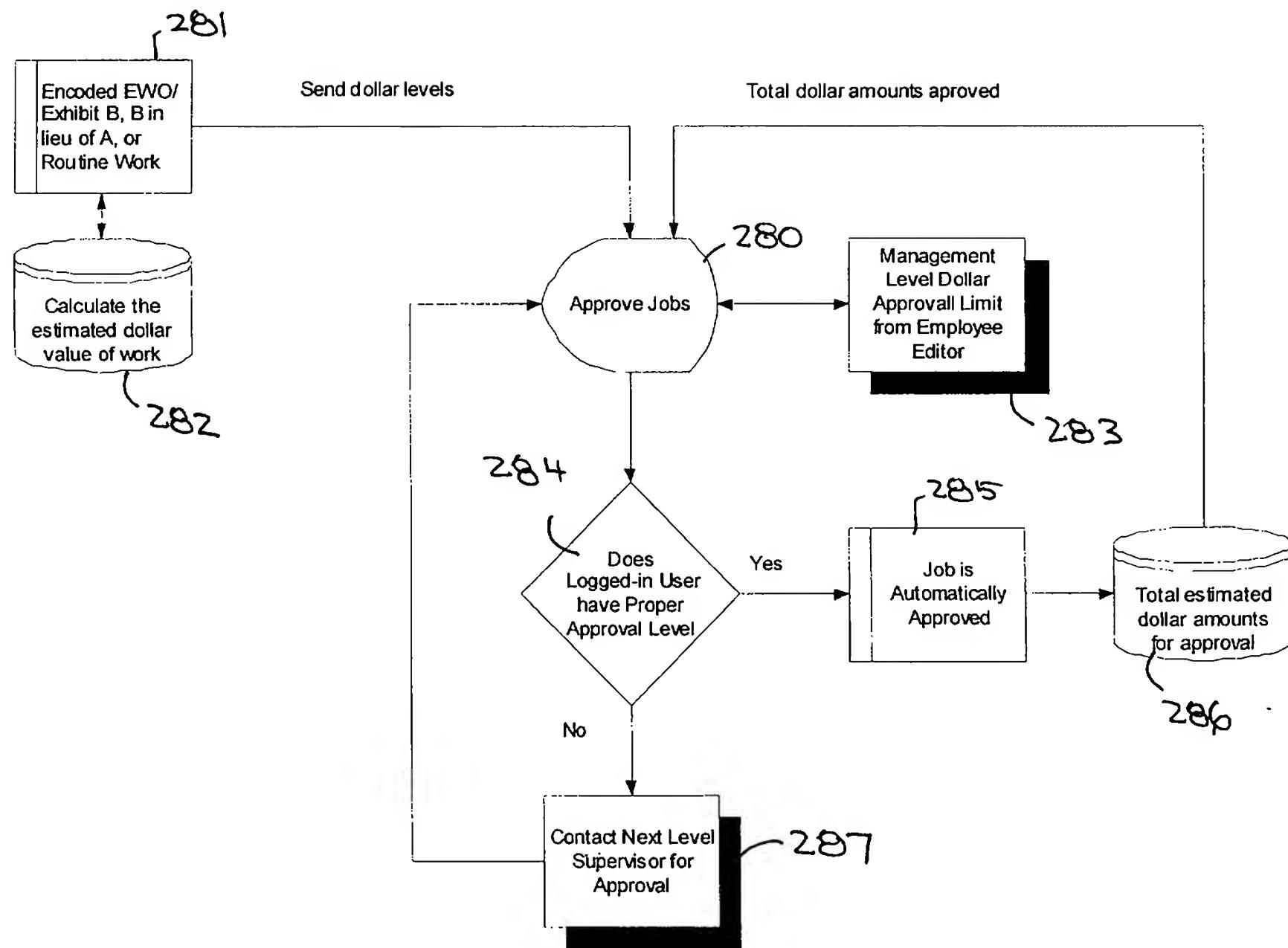


FIGURE 6

# Inspections Census

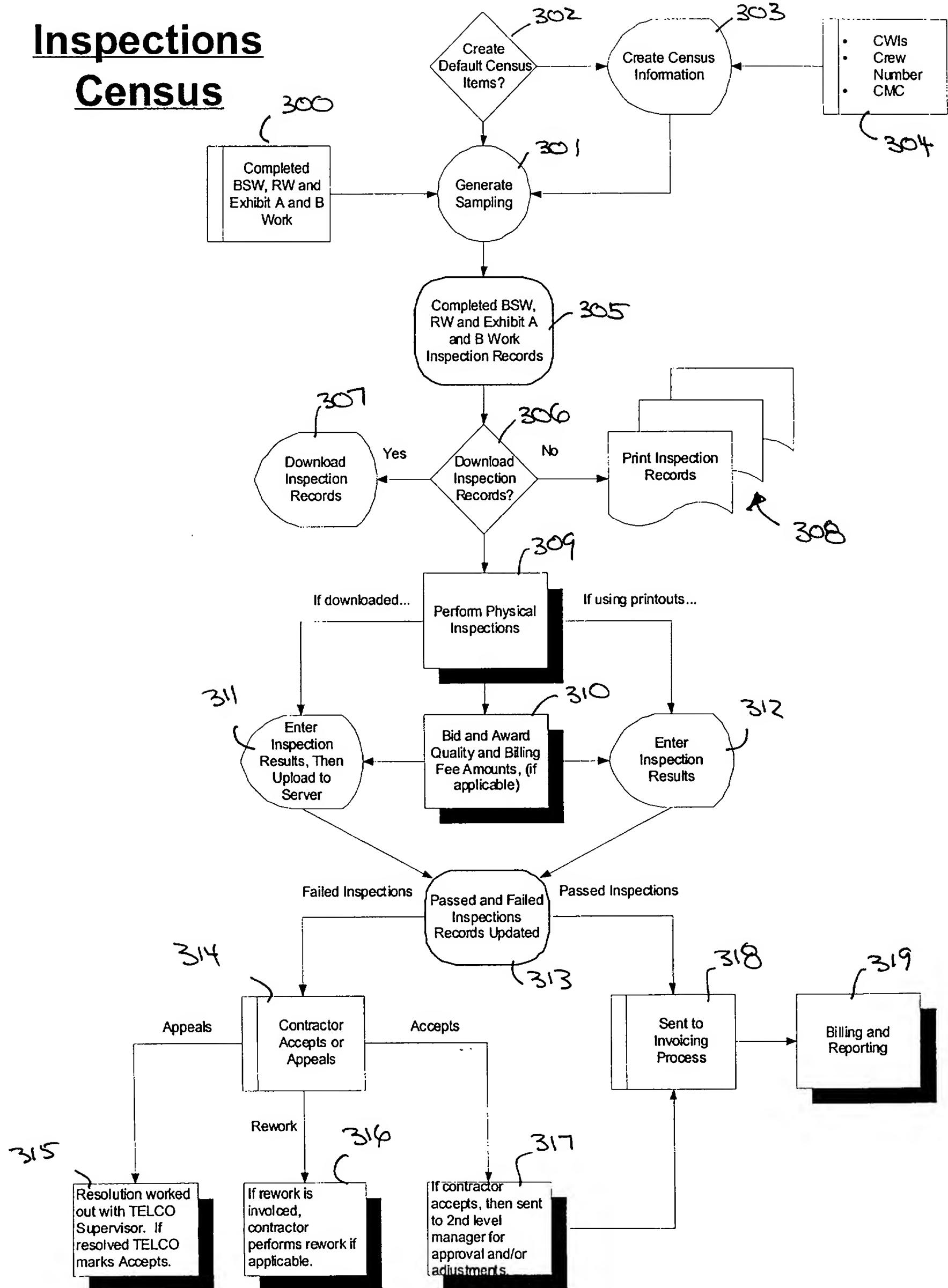
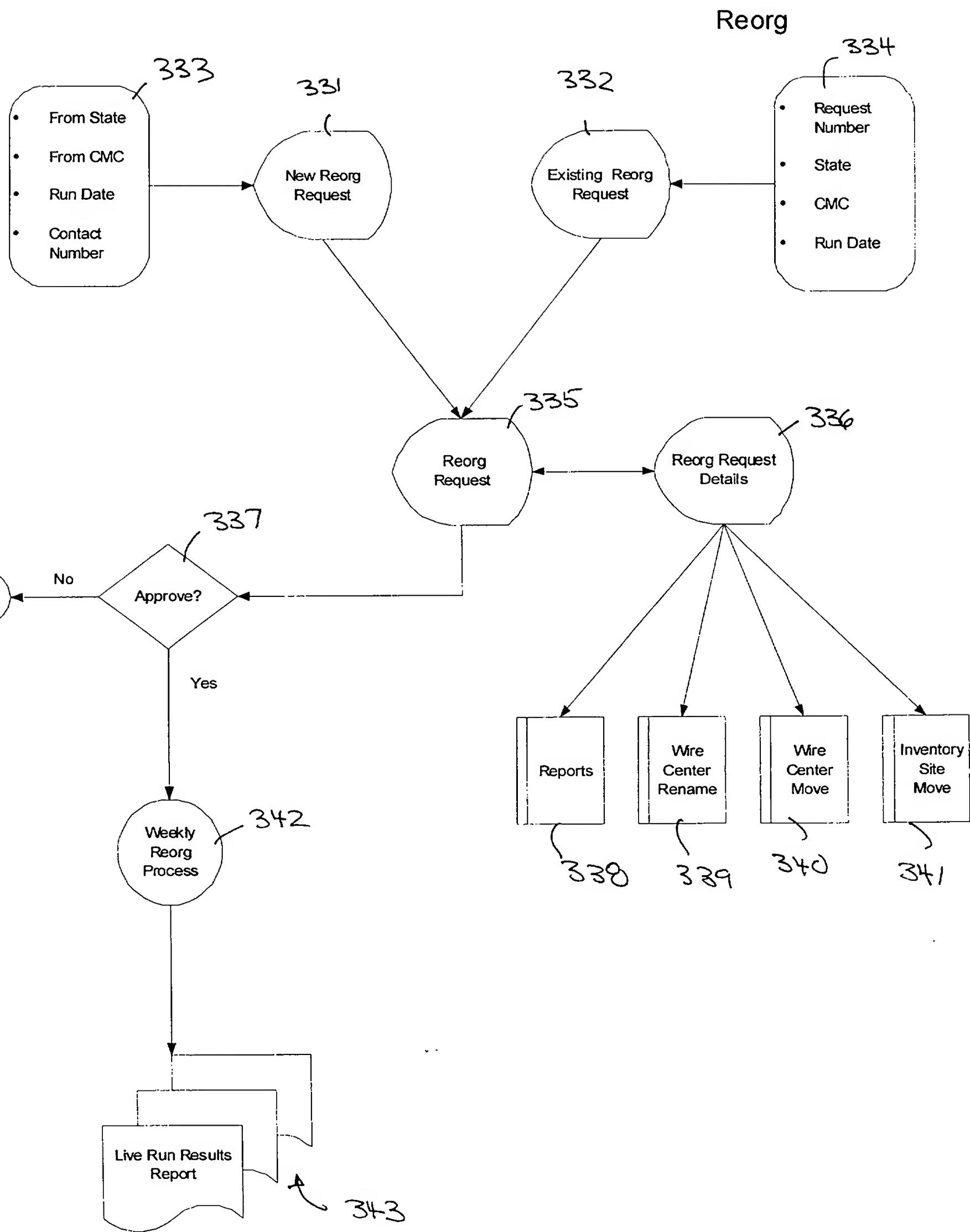


FIGURE 7



**FIGURE 8**

**DECLARATION FOR PATENT APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below), or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**OUTSIDE PLANT CONSTRUCTION MANAGEMENT SYSTEMS AND METHODS**

the specification of which (check one)

is attached hereto

was filed on \_\_\_\_\_  
as application Serial No. \_\_\_\_\_

and was amended on: \_\_\_\_\_  
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 (a) - (d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified, by checking the box below, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Applications			Priority Claimed		Copy Attached	
Application Number	Country	Foreign Filing Date (MM/DD/YYYY)	YES	NO	YES	NO

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below and claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT international application(s) designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application: Continuation-in-Part

Parent Application Number	Filing Date	Status (Mark Appropriate Column Below)		
		Patented	Pending	Abandoned
60/058,504	09/11/98		✓	

Inventors names: William M. Seal, Terry L. Small, Carol A. Brechtel, Gail W. Deaton, Ronald M. Cochran  
 Filed: September 11, 1998  
 For: OUTSIDE PLANT CONSTRUCTION MANAGEMENT SYSTEMS AND METHODS  
 DECLARATION FOR PATENT APPLICATION

Parent Application Number	Filing Date	Status (Mark Appropriate Column Below)		
		Patented	Pending	Abandoned
60/058,570	09/11/98		✓	
60/058,571	09/11/98		✓	
60/058,572	09/11/98		✓	
60/058,579	09/11/98		✓	
60/058,580	09/11/98		✓	
60/058,581	09/11/98		✓	
60/058,582	09/11/98		✓	
60/058,641	09/11/98		✓	
60/058,657	09/11/98		✓	
60/058,658	09/11/98		✓	

As named inventor, I hereby revoke all prior powers and appoint the following attorney(s) and agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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